

Incident description: gas leak 2015

The well was plugged back with primary and secondary barriers and readied for drilling a new sidetrack in accordance with requirements. All the barriers against the reservoir were categorised as intact, and the well was classified with a green integrity status. Gas was freed when pulling the seal assembly through the open valve on annulus A and up the riser. That triggered gas detection on the wellhead deck and in the drilling module. A general alarm was activated with consequent mustering. The central control room activated manual shutdown and blowdown. The position was clarified after 30 minutes.

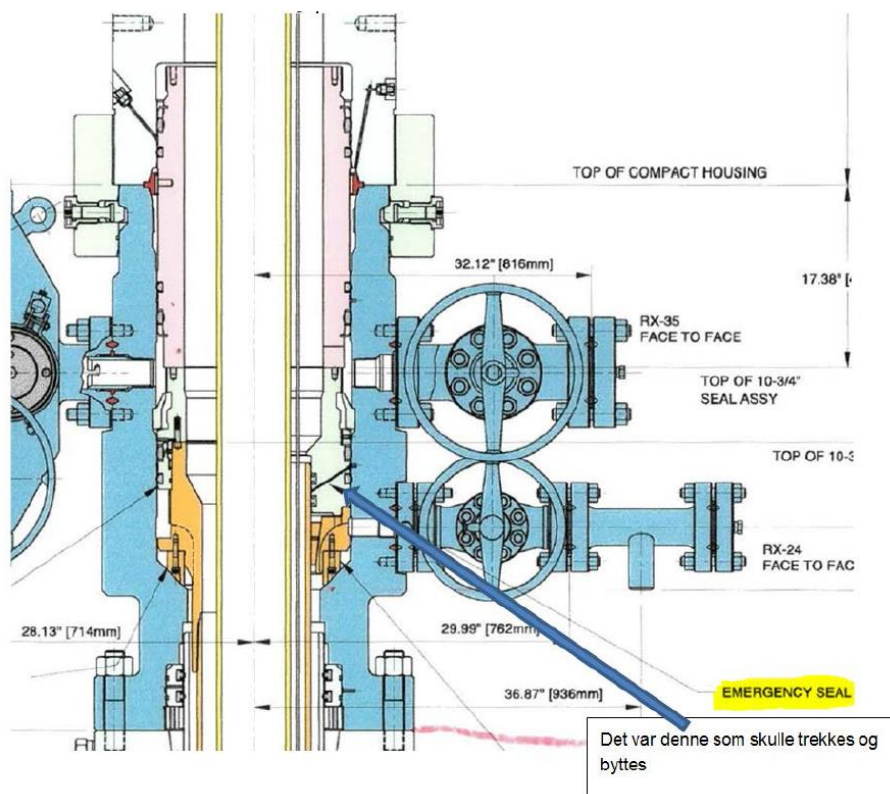


Figure 1 Seal assembly to be pulled and replaced.

The gas which leaked out was enclosed between the primary and secondary barriers in annulus B.

According to the operational procedure, pressure in annulus B must be monitored and annulus A closed when pulling the seal. Depressurisation of the B annulus had not been verified when the seal assembly was pulled. Gas at low pressure was released and leaked through the two-inch valve on annulus A and up the riser to the drill floor. This triggered gas detection on the wellhead deck and in the drilling module, with consequent shutdown of the platform.

The estimate volume in annulus B was about 15m³. Calculations indicate that the initial leak rate could have been 3.5kg/s, but that this fell to less than 1kg/s within 10 seconds and that the emission lasted about a minute. Roughly 31kg of gas was emitted.

Causes

Direct cause

- The seal assembly was pulled without checking that annulus B was gas-free/depressurised or blown down between the barriers in annulus B.

Underlying causes

- The well was categorised as green, which means in barrier terms that no ruptures or leaks are present in the well barriers. Little attention was paid to possibility of gas pressure between the primary and secondary barriers in annulus B.
- Handover documentation did not include remarks concerning the history of pressure build-up in the annulus.
- The scale on the pressure manometer was inappropriate for reading off low pressures.
- Imprecise operational procedures and documentation.
- Mismatch between procedures from operations and the supplier.
- Inadequate compliance with procedures.
- Inadequate planning and control.
- Inadequate pre-job conversation, inadequate communication during execution. Gas under the seal assembly was identified as a possible risk in the operational procedure, but not taken sufficiently into account when carrying out the work.

Lessons and recommendations

- Replace the manometer to secure a more appropriate scale for reading off low pressures.
- Improve pre-job conversations, including a review of identified risks.
- Ensure procedures are mutually consistent between the supplier and operations.
- Improve the quality of the operational procedure. Ensure that it clearly specifies what is to be done and in what sequence.
- Strengthen the attention paid by management in order to ensure risk understanding and compliance with procedures.
- When working on barrier elements, depressurisation of the system must always be verified immediately before starting work even when the pressure has been bled off on an earlier occasion – during handover of the well from another department, for example.